

Fig. E-1

Breakdown of preoperative hospital costs in the morbidly obese and control patients undergoing reverse shoulder arthroplasty. See Table E-7 for a more complete description of the preoperative costs. CXR = chest radiograph, EKG = electrocardiography, Micro = microbiology, IFC = infrequent charges, and Δ = difference. *Indicates a significant difference between the two patient populations.

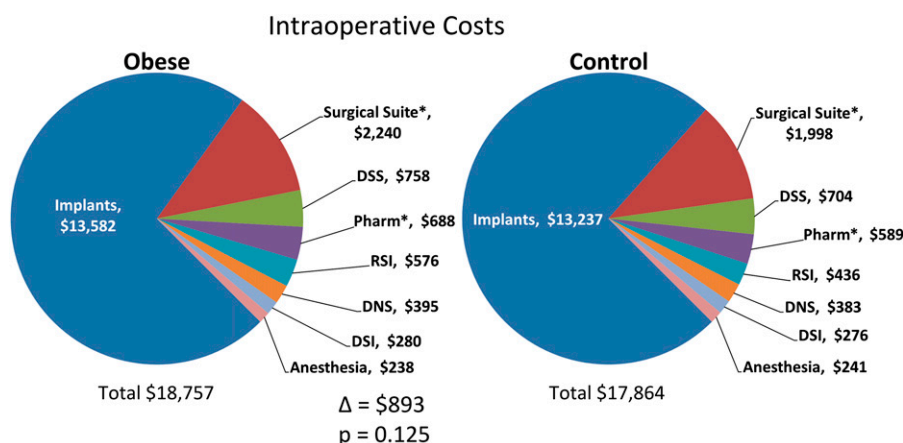


Fig. E-2

Breakdown of intraoperative hospital costs in the morbidly obese and control patients undergoing reverse shoulder arthroplasty. See Table E-7 for a more complete description of the intraoperative costs. DSS = disposable surgical supplies (except surgical instruments), Pharm = pharmacy, RSI = reusable surgical instruments, DNS = disposable nonsurgical supplies, DSI = disposable surgical instruments, and Δ = difference. *Indicates a significant difference between the two patient populations.

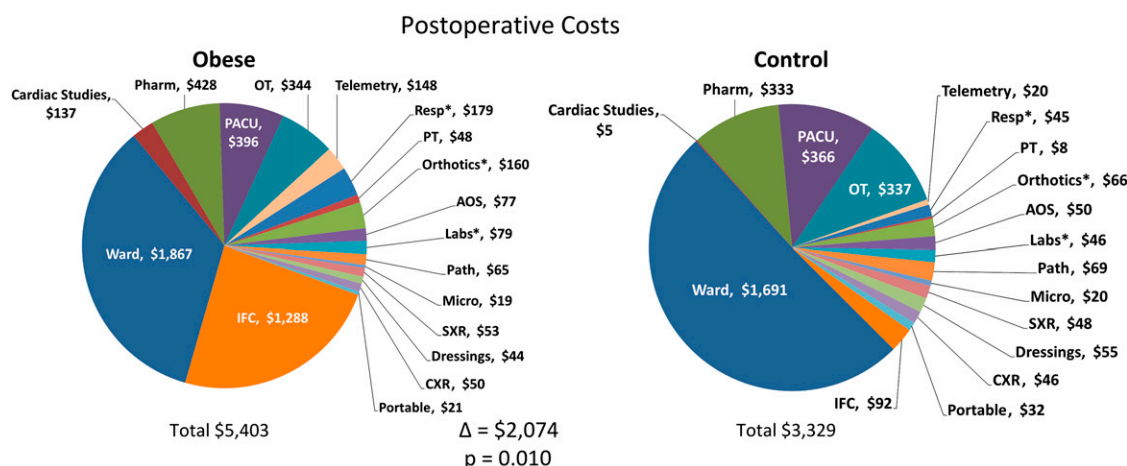


Fig. E-3
Breakdown of postoperative hospital costs in the morbidly obese and control patients undergoing reverse shoulder arthroplasty. See Table E-7 for a more complete description of the postoperative costs. Pharm = pharmacy, PACU = post-anesthesia care unit, OT = occupational therapy, Resp = respiratory, PT = physical therapy, AOS = all other supplies, Path = pathology, Micro = microbiology, SXR = shoulder radiograph, CXR = chest radiograph, IFC = infrequent charges, and Δ = difference. *Indicates a significant difference between the two patient populations.

TABLE E-1 Range of Motion*					
	Obese†	Controls†	P Value	Normally Distributed	
				Obese	Controls
FF preop. (deg)	61 ± 26	74 ± 42	0.315	Y	N
FF postop. (deg)	139 ± 39	153 ± 31	0.110	Y	N
Abd. preop. (deg)	56 ± 20	68 ± 35	0.134	Y	N
Abd. postop. (deg)	125 ± 49	138 ± 40	0.284	N	N
ER preop. (deg)	11 ± 25	26 ± 26	0.034	Y	Y
ER postop. (deg)	54 ± 35	55 ± 33	0.945	N	Y
Change in ER (deg)	43 ± 43	28 ± 42	0.393	N	N
IR preop.‡	L5 ± 2	L3 ± 2	0.029	N	N
IR postop.‡	T12 ± 2	T12 ± 2	0.846	Y	N
Change in IR‡	L3 ± 3	L5 ± 3	0.425	Y	Y

*FF = forward flexion, Abd = abduction, ER = external rotation, and IR = internal rotation. †The values are given as the mean and the standard deviation. ‡Reported as vertebral levels.

TABLE E-2 Surgical Data					
	Obese*	Controls*	P Value	Normally Distributed	
				Obese	Controls
EBL† (mL)	237 ± 47	197 ± 52	0.008	Y	N
Procedure time (min)	118 ± 35	109 ± 35	0.156	N	N
Total room time (min)	185 ± 30	172 ± 42	0.014	Y	N
Total – procedure time (min)	68 ± 15	63 ± 21	0.200	Y	N
*The values are given as the mean and the standard deviation. †EBL = estimated blood loss.					

TABLE E-3 Radiographic Data*				
	Obese	Controls	OR (95% CI)	P Value
Scapular notching			0.58 (0.06 to 5.3)	0.63
Y	1 (1 G1)	5 (3 G1, 2 G2)		
N	20	58		
Reactive bone at scapular neck			1.5 (0.5 to 4.3)	0.48
Y	7	16		
N	14	47		
Humeral loosening			0.58 (0.03 to 12.6)	0.73
Y	0	2		
N	21	61		
Glenoid-sided failure				NA
Y	0	0		
N	21	63		
Mechanical failure				NA
Y	0	0		
N	21	63		
*G = grade, and NA = not applicable.				

TABLE E-4 Major Complications*

Complication (Treatment and Outcome)	
Obese	Controls
COPD exacerbation (readmission)	Acromial fracture, nondisplaced (2 mo in sling)
Acromial base fracture after fall at home (healed with 8 wk in sling)	Scapular spine fracture (6 wk in abduction brace; healing clinically but incomplete healing radiographically)
V-tach postop. (ICU, cardiac catheterization and ablation on POD 2)†	Postoperative pain (ED readmission after discharge on POD 3)
Acromial fracture (resolved with 6 wk in sling)†	Scapular spine fracture, acute, after fall (nonunion or delayed union at 4 mo of ongoing bone stimulator treatment)
	Dislocation between 2-3 yr. postop. (self-reduced on the scene without recurrence)
	Scapular spine fracture (despite nonoperative treatment, slow decline in function over last yr)
	Wound drainage on POD 10 (patient consulted independent ID physician, on IV Daptomycin for 6 wk)
	Humeral stem loosening (revised at 75 mo postop.)
*COPD = chronic obstructive pulmonary disease, V-tach = ventricular tachycardia, ICU = intensive care unit, ED = emergency department, POD = postoperative day, and IV = intravenous. †In same patient.	

TABLE E-5 Minor Complications*

Complication (Treatment and Outcome)	
Obese	Controls
Superficial wound infection (Keflex for 14 d)	Wound drainage (wound care and Augmentin for 2 wk)
Ankle gout and neck arthritis flare-up postop. (NSAIDs)	Wound erythema (Keflex for 10 d)
RVR postop. (rate-control medications; patient has chronic known A-fib)	RVR postop. (rate-control medications; patient has chronic known A-fib)†
	Neck pain exacerbation (spine referral, resolved conservatively)†
	C6 radiculopathy exacerbation (present preop. but noticeable postop. due to elbow weakness, resolved)
	Postop. nausea (head CT)
	New-onset atrial flutter (outpatient follow-up)
	Hypoxia/hemidiaphragm paralysis, secondary block (extra stay of 1 d in telemetry, fever work-up for atelectasis)
	UTI (antibiotics)
	Anemia postop. (2 units PRBC transfused)
	Hyponatremia, Na ⁺ 120 mEq/L (free water restriction after discharge)‡
	Atelectasis (postop. fever work-up)
	Oral herpes flare-up (acyclovir)‡
	Gastroenteritis postop. (dehydration developed, treated with oral hydration)
*NSAID = nonsteroidal anti-inflammatory drug, RVR = rapid ventricular rate, A-fib = atrial fibrillation, CT = computed tomography, UTI = urinary tract infection, and PRBC = packed red blood cells.	

TABLE E-6 Classification of Obesity According to WHO* and Commonly Used Terminology		
Commonly Used Term	WHO Nomenclature	BMI (kg/m^2)
Ideal BMI	Normal	18.5-24.99
Overweight	Overweight or pre-obese	25-29.99
Obese	Obese class I	30-34.99
Severely obese	Obese class II	35-39.99
Morbidly obese	Obese class III	40-49.99
Super obese	Obese class III	≥ 50
<p>*http://apps.who.int/bmi/index.jsp?introPage=intro_3.html and http://www.obesitysurgerydallas.com/bmi.html. Accessed 2013 July 28. WHO = World Health Organization.</p>		

TABLE E-7 Detailed Cost Breakdown*

Variable	Obese, N = 21		
	N	Min.-Max. (\$)	Mean (\$)
Total cost	21	18,790-57,649	24,482 ± 7972
Preop.	21	212-474	322 ± 67
Intraop.	21	14,579-22,769	18,757 ± 1940
Postop.	21	2372-38,771	5403 ± 7813
Preop.			
Laboratory	18	8†-92	33 ± 25
Microbiology	15	12†-32	14 ± 5
Chest radiograph	14	28†-63	29 ± 12
EKG	15	34†-46	29 ± 3
Holding room	21	17-151	67 ± 36
Surgical prep.	20	103†-181	148 ± 22
Infrequent charges	1	38†	2 ± 8
Intraop.			
Surgical suite usage	21	1868-2724	2240 ± 246
Anesthesia services	21	174-325	238 ± 39
Implants	21	8590-17,419	13,582 ± 1774
Disposable surgical instruments	21	75-512	280 ± 133
Reusable surgical instruments	20	53†-1298	576 ± 470
Disposable surgical supplies (except surgical instruments)	21	386-1384	758 ± 235
Disposable nonsurgical supplies	21	190-573	395 ± 107
Pharmacy	21	77-2087	688 ± 518
Infrequent charges	0		
Postop.			
PACU	21	176-702	396 ± 148
Ward	21	1108-4920	1867 ± 840
Telemetry	13	124†-387	148 ± 75
Orthotics	21	82-304	160 ± 72
Laboratory	21	25-347	79 ± 80
Shoulder radiograph	21	36-134	53 ± 20
Chest radiograph	21	37-107	50 ± 19
Portable services	11	28†-107	21 ± 24
OT	21	182-682	344 ± 127
PT	6	77†-372	48 ± 116
Respiratory	21	11-1335	179 ± 300
Pharmacy	21	109-1981	428 ± 440
Dressing supplies	20	14†-112	44 ± 28
All other supplies	20	8†-486	77 ± 112
Microbiology	7	15†-289	19 ± 102
Pathology	20	56†-171	65 ± 25
Cardiac studies	5	44†-1049	137 ± 462
Infrequent charges	8	35†-13,363	1288 ± 5768

*For the twenty-one morbidly obese and sixty-one control patients for whom cost data were available. EKG = electrocardiogram, PACU = post-anesthesia care unit, OT = occupational therapy, and PT = physical therapy. †Minimum nonzero value.

TABLE E-7 (continued)

Controls, N = 61			Obese – Controls (\$)	P Value	Normally Distributed	
N	Min.-Max. (\$)	Mean (\$)			Obese	Controls
61	15,864-29,773	21,508 ± 2815	2974	0.009	Y	N
61	92-664	315 ± 97	7	0.75	Y	Y
61	12,677-24,157	17,864 ± 2380	893	0.13	Y	Y
61	1835-9990	3329 ± 1415	2074	0.010	N	N
56	6†-115	33 ± 18	0	0.30	N	N
36	15†-109	14 ± 17	0	0.44	N	N
51	28†-63	35 ± 12	-6	0.26	N	N
46	34†-92	32 ± 9	-3	0.27	N	Y
54	3†-214	43 ± 40	24	0.009	N	Y
58	103†-239	139 ± 32	9	0.10	N	N
13	30†-222	19 ± 41	-17			
61	1266-3388	1998 ± 490	242	0.002	N	Y
61	173-394	241 ± 47	-3	0.45	N	N
61	8100-18,851	13,237 ± 2071	345	0.11	N	N
61	12-664	276 ± 125	4	0.35	Y	N
57	54†-1682	436 ± 395	140	0.10	N	N
61	225-1283	704 ± 195	54	0.30	Y	Y
61	168-589	383 ± 75	12	0.60	Y	Y
60	22†-3142	589 ± 689	99	0.030	N	N
0						
61	119-933	366 ± 142	30	0.23	N	Y
61	1021-5940	1691 ± 842	176	0.06	N	N
7	71†-293	20 ± 74	128	0.08	Y	Y
61	26-287	66 ± 37	94	<0.0001	N	N
61	8-301	46 ± 46	33	0.019	N	N
61	36-89	48 ± 11	5	0.08	N	N
60	27†-114	46 ± 24	4	0.058	N	N
41	28†-100	32 ± 20	-11	0.07	N	N
61	114-913	337 ± 164	7	0.23	N	Y
5	33†-159	8 ± 46	40	0.21	Y	Y
55	11†-353	45 ± 63	134	0.012	N	N
61	46-909	333 ± 232	95	0.23	N	N
61	12-167	55 ± 36	-11	0.15	N	N
55	7†-340	50 ± 78	27	0.18	N	N
16	15†-343	20 ± 114	-1	0.46	N	N
59	45†-170	69 ± 21	-4	0.07	N	N
4	44†-164	5 ± 57	132	0.07	N	N
25	36†-670	92 ± 198	1196			

TABLE E-8 Breakdown of Infrequent Charges*

Variable	Obese, N = 21			Controls, N = 61			Obese – Controls (\$)
	N	Min.-Max. (\$)	Mean (\$)	N	Min.-Max. (\$)	Mean (\$)	
Preop.							
Shoulder radiograph	0			1	31†	1 ± 4	–1
Other radiograph	1	38†	2 ± 8	4	30†-63	3 ± 12	–1
Shoulder CT	0			5	93†-109	8 ± 28	–8
Other imaging	0			1	87†	2 ± 11	–2
Supplies	0			1	68†	1 ± 9	–1
ER visit	0			1	222†	4 ± 28	–4
Dialysis	0			0			
Intraop.							
Imaging	0			0			
Postop.							
Cath. laboratory	1	13,363†	636 ± 2,916	0			636
ICU	1	12,657†	603 ± 2,762	0			603
Nutrition	2	103†-114	10 ± 8	4	83†-103	6 ± 22	4
Vascular access	1	250†	13 ± 54	2	162†-600	12 ± 79	1
Other imaging	3	35†-324	26 ± 80	11	32†-430	22 ± 66	4
Blood bank	0			7	87†-670	45 ± 179	–45
GI studies	0			1	404†	7 ± 52	–7
Dialysis	0			0			
ST	0			0			

*For the twenty-one morbidly obese and sixty-one control patients for whom cost data were available. CT = computed tomography, ER = emergency room, Cath. = catheterization, ICU = intensive care unit, GI = gastrointestinal, and ST = speech therapy. †Minimum nonzero value.